Coatings
Corrosion
Fracture and Mechanical Testing
High Temperature Mechanical Properties
Hydrogen Production and Storage Materials
Hydrogen Separation Materials
Irradiation
Materials Validation
Microstructure and Physical Properties
Modeling
Neutron Radiography
Nondestructive Evaluation
Post-irradiation Examination
Synthesis and Processing of Novel Materials
Welding and Joining
X-Ray Radiography

Coatings

Capabilities/Facilities

World-class instrumented thermal spray laboratory for in-situ process monitoring and control. Advanced plasma coating process and system development.

Materials

Complex high-temperature intermetallics, ceramics, corrosion-resistant metallic alloys.

Scientific/Engineering Issues

Automation and control of the thermal spray process, high temperature protective coatings for energy systems, coatings for PWR "core catcher" application, fuel cell fabrication.

Staff

Richard Williamson, W. David Swank, Terry Totemeier, Richard Wright, and Peter Kong.

Recent Projects

- Thermal Plasma Program, DOE Office of Basic Energy Science, $520K/year
- Microstructure Properties of Thermal Spray Coatings, DOE Office of Fossil Energy, $170K/year

Collaborations

- Oak Ridge National Laboratory
- Lehigh University
- State University of New York at Stony Brook
- Boston University

Publications

"Microstructure and Stresses in HVOF-Sprayed Iron Aluminide Coatings," T.C. Totemeier, R.N. Wright and W.D. Swank, *Journal of Thermal Spray Technology*, Vol. 11, p. 400, 2002.

"Corrosion of Thermal Spray Hastelloy C-22 Coatings in Dilute HCl," T.E. Lister, R.N. Wright, P.J. Pinhero and W.D. Swank, *Journal of Thermal Spray Technology*, Vol. 11, p. 530, 2002.

"Mechanical Properties of HVOF-Sprayed Iron Aluminide Coatings," T.C. Totemeier, R.N. Wright and W.D. Swank, accepted for publication in *Metallurgical and Materials Transactions A*.

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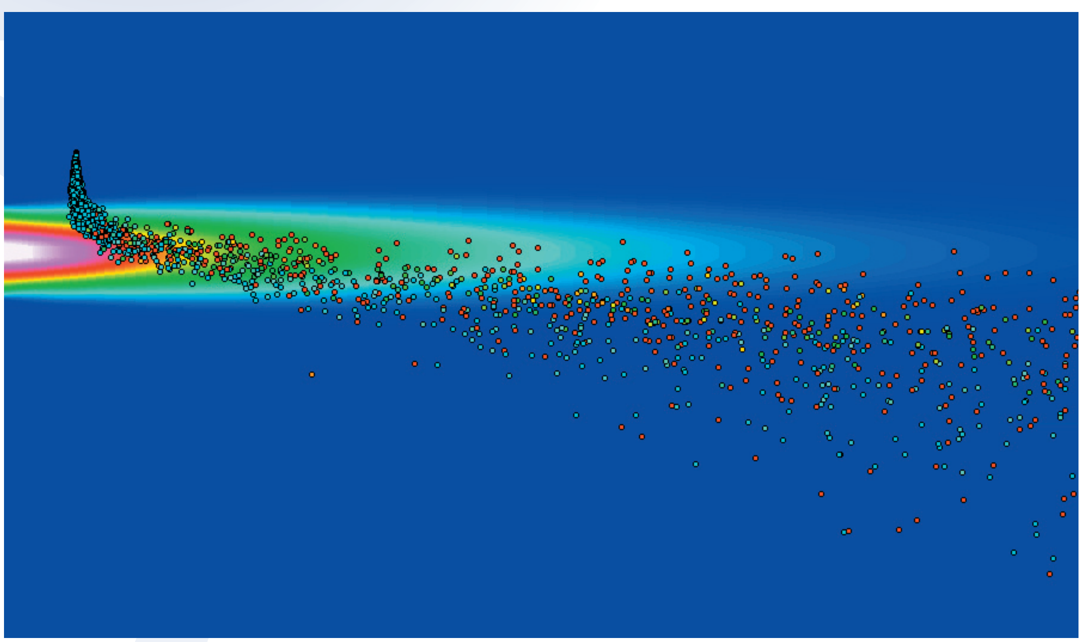

Numerical simulation of the thermal spray process. Contours depict the axial jet velocity; particle colors indicate melt fraction (red is fully melted). Simulation performed using the LAVA code developed at the Idaho National Laboratory.

For more information

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"Entrainment in High Velocity, High Temperature Plasma Jets, Part I: Experimental Results," J.R. Fincke, D.M. Crawford, S.C. Snyder, W.D. Swank, D.C. Haggard and R.L. Williamson, *International Journal of Heat and Mass Transfer*, Vol. 46, p. 4201, 2003.

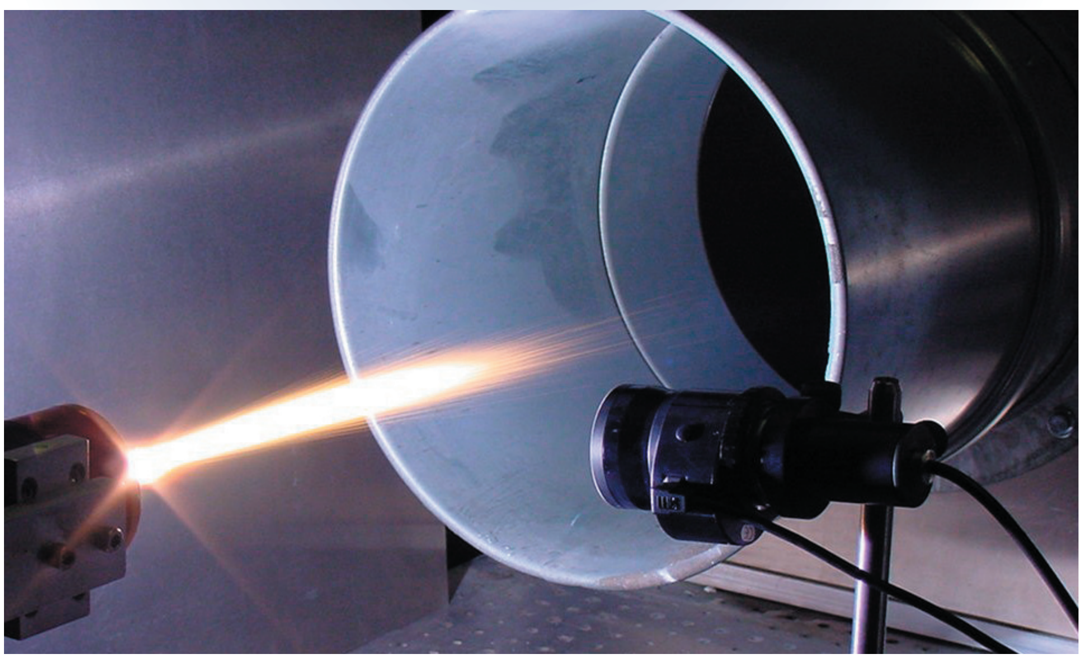
"Entrainment in High Velocity, High Temperature Plasma Jets, Part II: Computational Results and Comparison to Experiment," R.L. Williamson, J.R. Fincke, D.M. Crawford, S.C. Snyder, W.D. Swank and D.C. Haggard, *International Journal of Heat and Mass Transfer*, Vol. 46, p. 4215, 2003.

"An Advanced Model for Plasma Spraying of Functionally Graded Materials," Y.P. Wan, S. Sampath, V. Prasad, R. Williamson and J.R. Fincke, *Journal of Materials Processing Technology*, Vol. 137, p. 110, 2003.

"Numerical Study of the Relative Importance of Turbulence, Particle Size and Density, and Injection Parameters on Particle Behavior During Thermal Plasma Spraying," R.L. Williamson, J.R. Fincke and C.H. Chang, *Journal of Thermal Spray Technology,* Vol. 11, p. 107, 2002.

"FeAl and Mo-Si-B Intermatellic Coatings Prepared by Thermal Spraying," T.C. Totemeier, R.N. Wright, and W.D. Swank, Intermetallics, Vol. 12 (2004), pp. 1335-1344.

"Residual Stresses in High-Velocity Oxy-Fuel Metallic Coatings," T.C. Totemeier, R.N. Wright, and W.D. Swank, Metallurigical and Materials Transactions A, Vol. 35A (2004), pp. 1807-1814.



Passive diagnostics of sprayed particle's temperature, size and velocity with active control capability.

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